

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently amended) A method of manufacturing a semiconductor device comprising:

a first step of depositing a first film and a second film on a conductive layer in this order and etching a desired portion of the second film with a first etching gas until the first film is exposed, the first film being made of one of a silicon nitride film and a silicon nitride oxide film, the second film being made of a silicon oxide film;

a second step of removing a reaction product deposited on the first film through the first step with a second etching gas which is of O₂ ~~comprising O and free of F~~ to expose the first film;

a third step of etching the first film exposed through the second step with a third etching gas until the conductive layer is exposed; and

a fourth step of removing a reaction product deposited on the conductive layer through the third step with a fourth etching gas which is of O₂ ~~comprising O and being free of F~~, thereby forming a concave portion penetrating the first and second films to reach the conductive layer surface, ~~so that no F gas is used during removal of the reaction products.~~

2. (Original) A method according to claim 1, wherein the first, second, third and fourth steps are successively carried out in a single apparatus maintaining therein a vacuum state.

3. (Original) A method according to claim 1, wherein the first etching gas contains at least one of CHF_3 , C_4F_8 and C_5F_8 .

4. (Original) A method according to claim 1, wherein the third etching gas contains at least one of CHF_3 and CH_2F_2 .

5. (Original) A method according to claim 1, wherein the second and fourth etching gases contain O_2 and the etching in the second and fourth steps is carried out under plasma conditions.

6. (Original) A method according to claim 1, wherein the conductive layer is a silicon substrate and the concave portion is a contact hole.

7. (Original) A method according to claim 1, wherein the conductive layer is a layered substrate on which an electrode is layered and the concave portion is a via hole.

8. (Previously presented) The method of claim 1, wherein the conductive layer is a semiconductor substrate.

9. (Currently amended) A method of manufacturing a semiconductor device, the method comprising:

depositing a first film comprising silicon nitride on a conductive layer, and thereafter depositing a second film comprising silicon oxide over the first film comprising silicon nitride;

etching a desired portion of the second film comprising silicon oxide with a first etching gas to form an aperture in the second film,

using a second etching gas of O₂ to remove a first reaction product deposited on the first film under said aperture defined in the second film, the first reaction product having been formed due to said etching of the second film;

after removing the first reaction product, using a third etching gas to etch the first film at an area where the first reaction product was removed until the conductive layer is exposed thereby forming an aperture in the first film over an exposed area of the conductive layer;

using a fourth gas of O₂ to remove a second reaction product deposited on the conductive layer under said aperture defined in the first film, the second reaction product having been formed due to said etching of the first film, thereby forming a concave portion penetrating the first and second films to reach the conductive layer; and

wherein at least one of the second and fourth gases is of O₂ ~~comprises oxygen and~~
~~is free of F, so that no F gas is used during removal of at least one of the reaction~~
products.

10. (Previously presented) A method according to claim 9, wherein all of the recited steps are successively carried out in a single apparatus maintaining therein a vacuum state.

11. (Previously presented) A method according to claim 9, wherein the first etching gas comprises at least one of CHF₃, C₄F₈ and C₅F₈.

12. (Previously presented) A method according to claim 9, wherein the third etching gas comprises at least one of CHF₃ and CH₂F₂.

13. (Previously presented) A method according to claim 9, wherein the etching using the second and fourth gas(es) is carried out under plasma conditions.

14. (Previously presented) A method according to claim 9, wherein the conductive layer is a semiconductor substrate, and the concave portion is a contact hole.

15. (Previously presented) A method according to claim 9, wherein the conductive layer is a layered substrate on which an electrode is layered and the concave portion is a via hole.